WHAT IS CLAIMED IS:

1. A method for producing magnetic recording media, the method comprising:

forming a magnetic layer over a substrate;

ionizing a source material so as to form a plasma containing ions which comprise carbon; and

energizing the ions to form a stream from the plasma toward the substrate so that carbon from the ions is deposited on the substrate, wherein the ions impact with an energy which promotes formation of sp^3 carbon-carbon bonds.

2. A method as claimed in claim 1, further comprising selectively energizing the stream with a predetermined impact energy.

3. A method as claimed in claim 1, wherein the stream impacting the substrate is primarily composed of ions having a uniform weight.

4. A method as claimed in claim 1, wherein the impact energy of the ions is substantially uniform.

5. A method as claimed in claim 1, further comprising filtering the stream to control weight and impact energy of the ions impacting the substrate.

6. A method as claimed in claim 5, wherein the filtering step comprises obstructing a path between the source material and the substrate, and guiding the ions of the stream around the obstruction.

7. A method as claimed in claim 6, wherein the stream is filtered through a curvilinear electromagnetic duct.

8. A method as claimed in claim 1, wherein the ionizing step comprises interelectrode vaporization of the

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source material, the source material comprising a solid carbon cathode.

14 ~~9~~. A method as claimed in claim 13 ~~8~~, wherein the energizing step comprises electrostatically biasing the ions toward the substrate.

15 ~~10~~. A method as claimed in claim 1, wherein the energizing step comprises selectively accelerating the ions toward the substrate to provide the impact energy.

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16 ~~11~~. A method as claimed in claim 15 ~~10~~, wherein the selectively energizing step comprises varying the potential of a cathodic arc source.

12. A method as claimed in claim 1, wherein the energizing step comprises applying an alternating potential between a coupling electrode and an extraction grid having a smaller surface area than the coupling electrode so that the plasma is self-biasing relative to the extraction grid.

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13. A method as claimed in claim 1, wherein the source material comprises a gas having a substantially coherent dissociation energy spectra.

19 ~~14~~. A method as claimed in claim 18 ~~13~~, wherein the source material comprises acetylene.

5 ~~15~~. A method as claimed in claim 1, wherein the impact energy is between about 57 and 130 eV for each carbon atom.

6 ~~16~~. A method as claimed in claim 15, wherein the impact energy is between about 100 and 120 eV for each carbon atom.

~~17~~. Magnetic recording media comprising:

a substrate;

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a magnetic layer disposed over the substrate; and

a protective layer disposed over the magnetic layer, the protective layer comprising a highly tetrahedral amorphous carbon.

18. A recording media as in claim 17, wherein the highly tetrahedral amorphous carbon of the protective layer includes more than about 35% sp^3 carbon-carbon bonds.

19. A recording media as in claim 17, wherein the highly tetrahedral amorphous carbon of the protective layer includes more than about 70% sp^3 carbon-carbon bonds.

20. A recording media as in claim 17, wherein the sp^3 carbon-carbon bonds are at least in part formed by directing an energized stream of carbon ions toward the substrate.

21. A recording media as in claim 17, wherein the density of the protective layer is more than 2.5 g/cm^3.

22. A recording media as in claim 17, wherein the highly tetrahedral amorphous carbon of the protective layer does not include macroparticles.

23. A recording media as in claim 17, wherein the protective layer has a hardness of over about 50 GPa.

24. A recording media as in claim 17, wherein the protective layer has a thickness of less than about 75 Å.

25. A recording media as in claim 17, wherein the highly tetrahedral amorphous carbon of the protective layer further comprises hydrogen.

26. A recording media as in claim 25, wherein the protective layer comprises between about 8 and 18 atomic percent hydrogen.

27. A recording media as in claim 17, wherein the highly tetrahedral amorphous carbon of the protective layer further comprises nitrogen.

28. A recording media as in claim 26, wherein the protective layer comprises between about 4 and 30 atomic percent nitrogen.

29. A method for enhancing an ion beam, the ion beam produced by inductively ionizing a plasma within a plasma volume and capacitatively coupling the plasma so as to form a stream of ions from within the plasma volume, the method comprising:

moving a magnetic field through the plasma volume to promote even resonant inductive ionization and homogenize the ion beam.

30. A method as claimed in claim 29, wherein moving the magnetic field comprises selectively energizing magnetic coils disposed about the plasma volume.

31. A method as claimed in claim 29, wherein the magnetic field rotates through the plasma volume with a frequency which is much less than the frequency of an alternating induction potential.

32. A method as claimed in claim 29, wherein the magnetic field is transverse and rotates about an axis which is substantially normal to a capacitatively coupled extraction grid.

33. A method as claimed in claim 29, wherein the magnetic field rotates with a frequency of less than 10,000 Hz.

34. An inductive ionization resonance system for use with an ion-beam source including an antenna disposed about a plasma volume for inductively ionizing a plasma

therein, a coupling electrode exposed to the plasma volume, and an extraction electrode disposed over an opening of the plasma volume so that the extraction electrode is capable of extracting a stream of ions of the plasma therethrough by capacitive coupling, the system comprising at least one coil disposed adjacent the plasma volume, the at least one coil capable of moving a transverse magnetic field through the plasma volume to homogenize the stream of ions.

35. A system as claimed in claim 34, further comprising a plurality of coils disposed about the container so that the magnetic field can be moved within the plasma volume by selectively energizing one or more coils.

36. A system as claimed in claim 35, wherein the plurality of coils are radially disposed about the axis.

37. A system as claimed in claim 34, wherein the plasma volume substantially defines a length and a diameter, wherein the opening is disposed at one end of the length, and wherein the length is between about one third the diameter and three times the diameter.